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(54) **AIR FILTERING DEVICE**

LUFTFILTERVORRICHTUNG

DISPOSITIF DE FILTRAGE D'AIR

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WO-A-94/08142 **CH-A- 594 439**
DE-A- 3 702 765 **DE-A- 3 922 772**
FR-A- 2 378 555 **JP-A- 63 118 550**
US-A- 2 114 761 **US-A- 4 173 458**
US-A- 5 395 410

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EP 1 027 129 B1

Description

Field of the Invention

[0001] This invention relates to air filters. In particular, this invention relates to air filters incorporating filtering media and a centrifugal fan, the centrifugal fan preferably being attachable to the rotor plate of a common ceiling fan.

Background of the Invention

[0002] Air in homes or in business workplaces typically includes a colloid suspension of smoke particles, plant pollens, mold spores, and dust particles. Cigarette smoke suspended in the air of a home or a workplace, commonly known as secondhand smoke, is widely suspected as being a carcinogen. Pollen and mold spores suspended in the air of a home or a workplace are common allergens which may cause sinusitis or hayfever, and other respiratory ailments. Dust suspended in the air may be harmful to persons in a home or workplace who have emphysema or asthma. Additionally, airborne smoke and dust tends to discolor and soil items in a home or workplace such as curtains and furniture. Thus, it is widely seen as desirable to create home and workplace environments whose air is substantially free of airborne smoke, pollen, mold spores, and dust.

[0003] Several types of apparatus for cleaning and filtering air within a home or workplace are known. Many have disadvantages. For example, free standing electric air cleaning machines, typically incorporating an air impeller and a filtering medium mounted in the path of air flow, take up useable space within a room and typically create undesirable background noise. Another air filtering device having disadvantages is a carbon filter or an electrostatic air filter which is installable as an auxiliary element of a building's central air and heating system. Such systems are mechanically complex, and are expensive to construct, maintain, and operate.

[0004] The instant inventive air filtering device overcomes such disadvantages, among others, by providing a mechanically simple air filter which is economical to construct and operate, which takes up virtually no living or working space of a home or workplace, and which creates virtually no background noise. Such benefits are obtained through the provision of a centrifugal fan having a filtering media attached thereto and disposed therearound; the centrifugal fan and filtering media assembly being attachable to and rotatable by the rotor plate of a common ceiling fan; such ceiling fan having its fan blades removed.

Prior Art Patents

[0005] U.S. Patent No. 4,849,862 issued July 18, 1989, to *Diskin, et al.*, discloses a ceiling suspended air purifying light fixture.

[0006] U.S. Patent No. 4,750,863 issued June 14, 1988, to *Scoggins* discloses a fan shroud filter.

[0007] U.S. Patent No. 4,450,756 issued May 29, 1984, to *Kling* discloses a fume exhaust device.

[0008] U.S. Patent No. 4,840,650 issued June 20, 1989, to *Matherne* discloses a ceiling fan filter.

[0009] U.S. Patent No. 4,422,824 issued June 27, 1983, to *Eisenhardt* discloses a germ killing ceiling fan.

[0010] U.S. Patent No. 4,790,863 issued December 13, 1988, to *Nobiraki* discloses an air cleaner incorporating a centrifugal fan.

[0011] U.S. Patent No. 5,443,625 issued August 22, 1995, to *Schaffhausen* discloses an air filtering fixture.

[0012] U.S. Patent No. 4,676,721 issued June 30, 1987, to Hardee discloses a ceiling fan air cleaner.

[0013] FR 2,378,555A relates to a vacuum cleaner for use in machine shops or the like to vacuum up and return to a liquid state oil mist generated by lubricant use during metal turning on an open lathe.

[0014] JP 63-118550A relates to a ceiling installed air conditioner having a plurality of rotary blades attached to a rotor plate which rotates within a housing. The air conditioner is configured to combine functions of ventilation and imparting a spiral current to air supplied to the ventilator.

[0015] US 2,114,761 relates to a rechargeable unitary device for filtering or de-odorising air. The device comprises a stationary housing containing a shaft mounted impeller blade that is free to rotate relative to the housing.

[0016] US 4,173,458 relates to an engine air line air cleaner comprising a housing in which an impeller rotates. Cleaned air passes through a central outlet and air containing centrifugally separated dirt is exhausted through a peripheral outlet.

[0017] DE 3922772A discloses an air blade wheel formed by a carrier body in a box-like housing. The air-blade wheel is covered on the outside with a filter in a sling form. The filter is mounted inside a stationary housing that does not rotate with the fan blade.

[0018] WO 94/08142A relates to an air filter for use in conjunction with a ceiling fan. The air filter is stationary and is located both above and below the ceiling fan blade.

[0019] CH 594439A relates to a centrifugal filter comprising a drum lined with a filtering agent enclosing an impeller for drawing air into the filter. The outer housing of the filter is stationary.

[0020] US 5,395,410 relates to a fume exhauster configured to form an air curtain which prevents dissipation of the fumes to reinforce the exhausting effect of the fume exhauster.

[0021] DE 3702765 relates to an oil mist separator comprising a catch hood and radial fan.

Brief Summary of the Invention

[0022] According to an aspect of the present invention there is provided an air filtering device according to claim 1.

[0023] The present inventive air filtering device comprises an upper circular plate, preferably between three and four feet in diameter and the circular plate may be adapted for fixed attachment to and rotation by the rotor plate of a common ceiling fan; such ceiling fan having its fan blades removed.

[0024] Upon removal of the fan blades of, for example, a common four bladed ceiling fan, screw receiving fan blade attachment apertures of the ceiling fan's rotor plate are exposed. Typically, the lower surface of such rotor plate is elevated above the lower surface of the ceiling fan's motor housing. The upper circular plate of the present inventive air filtering device preferably extends conically upward, such upward extension terminating in a flattened circular upper end which is fitted for attachment to the rotor plate of the ceiling fan. Screw receiving filter attachment apertures are either drilled into or molded into the flattened upper end of the circular plate, such apertures being positioned and aligned so that they may underlie the fan blade attachment apertures of the ceiling fan's rotor plate. Also, a light fixture shaft aperture may be drilled or molded into such flattened open end. Such configuration of the upper circular plate and the filter attachment apertures allows the air filtering device to be easily and conveniently attached to the rotor plate by means of screws or bolts.

[0025] A multiplicity of fan blades are fixedly attached to or molded as a part of the lower surface of the circular plate so that they extend downwardly therefrom; the fan blades being radially configured and aligned in conformity with the common configuration of the blades of a centrifugal fan or pump. Upon operation of the ceiling fan motor to rotate the upper circular plate along with the blades extending therefrom, the blades centrifugally accelerate air outwardly in all radial directions.

[0026] Lower structural support of the blades is preferably provided by an annular ring which is molded as a part of or fixedly attached to the lower outside corners of the blades. Preferably, the annular ring presents an outwardly facing peripheral surface extending annularly around the outer edges of the fan blades. The outwardly facing peripheral surface preferably has a snap ridge receiving channel extending annularly therearound; the snap ridge receiving channel serving the function of securely and interchangeably holding a cylindrical air filter retaining frame containing an air filtering medium.

[0027] The air filter retaining frame preferably comprises a plastic downwardly opening U-channel ring, and a plastic upwardly opening U-channel ring, the U-channel rings preferably being interconnected by a pair of concentric cylindrical wire mesh walls. Preferably, the upper and lower edges of the wire mesh walls are respectively embedded within and held by the lower and upper surfaces of the U-channel rings. The combination of the upper and lower U-channel rings, and the concentric wire mesh walls defines a cylindrical filtering medium retaining and supporting space. Within such space, any of several air filtering media may be deposited. Suitable air filtering

media which may be deposited within such cylindrical space are activated charcoal, a pleated fiberglass mesh, pleated woven fabric filters either chemically treated or impregnated with activated charcoal, high efficiency particle arresting (HEPA) filters, or continuations of such filter media.

[0028] A snap ridge is preferably molded as a part of the lower U-channel ring so that the snap ridge extends inwardly from such ring's inwardly facing surface. Preferably, the filter retaining frame is closely fitted to the fan blades so that it may be slidably mounted over the outer edges of the fan blades, and so that it may be manually pressed into place, causing the snap ridge to snap into place within the snap ridge receiving channel of the annular ring. Removal and replacement of the air filter retaining frame is conveniently accomplished by manually pulling the air filter retaining frame downwardly, away from the blades, causing such frame to slide away from the fan blades. An opposite upward sliding motion imposed upon a new air filtering frame containing a fresh air filter medium replaces the removed air filter retaining frame.

[0029] In operation, upon rotation of the assembled air filtering device by the motor of a ceiling fan, air is drawn upward into the interior space of the air filtering device, and the air is centrifugally accelerated outward in all radial directions by the fan blades. The air then flows through the air filter retaining frame and through the air filtering medium contained therein. Such flow of air accomplishes continuous and noiseless filtration of the air, and accomplishes desirable air circulation.

[0030] Accordingly, it is an object of the present invention to provide an air filtering device which is readily installable upon the rotor plate of a common ceiling fan; such ceiling fan having its fan blades removed.

[0031] It is a further object of the present invention to provide such an air filtering device which utilizes centrifugal fan blades for accelerating the air.

[0032] It is a further object of the present invention to provide such an air filtering device further having an air filter retaining frame containing an air filtering medium, such frame being annularly mounted around the outer periphery of the centrifugal fan blades.

[0033] It is a further object of the present invention to provide such an air filtering device further providing a snap ridge and a snap ridge receiving channel for easy installation, removal, and replacement of the air filter retaining frame.

[0034] It is a further object of the present invention to provide such an air filtering device which is economically constructed, and what is quiet in operation.

[0035] Other and further objects, benefits, and advantages of the present inventive air filtering device will become known to those skilled in the art upon review of the *Detailed Description* which follows, and upon review of the appended drawings.

Brief Description of the Drawings

[0036]

Fig. 1 is an isometric view of the air filtering device, viewed from below.

Fig. 2 is an exploded isometric view of the air filtering device, viewed from below.

Fig. 3 is a partial sectional view of the air filtering device; the sectional plane being vertical, passing diametrically through the device.

Fig. 4 is a magnified view of a portion of Fig. 3.

Fig. 5 is a plan, partially sectional, view of the air filtering device, viewed from below; the plane of the section passing horizontally through such device.

Fig. 6 is a magnification of a portion of Fig. 5.

Detailed Description of the Preferred Embodiment

[0037] Referring now to the drawings, and in particular to Fig. 2, the fan blades of a common ceiling fan (not shown) are removed from the ceiling fan's motor 20, exposing a ceiling fan rotor plate 21, and screw receiving fan blade attachment apertures 22. A light fixture (not shown) attached to the ceiling fan is also removed, exposing a light fixture attachment shaft 23. Upon removal of such light fixture and ceiling fan blades, the ceiling fan is ready for installation of the air filtering device which, referring to Fig. 1, is referred to generally as drawing element 1.

[0038] Referring simultaneously to Figs. 1 and 3, the upper circular plate 14 of the air filtering device 1 is preferably between three and four feet in diameter. Preferably, the upper circular plate 14 extends conically upward terminating in a flattened circular area 15, such area being fitted for flush mounting against, referring to Fig. 2, the rotor plate 21 of the ceiling fan. Referring to Fig. 3, the upward slope of the conical section may commence (as shown) at the outer periphery of the upper circular plate 14 or, alternately, such slope may commence at the inner edges of the fan blades 12. The flattened circular area 15 preferably has four screw receiving air filter attachment apertures 17 and a central light fixture attachment aperture 16. Where the rotor plate 21 is adapted for attachment of five ceiling fan blades, five air filter attachment apertures in a pentagonal configuration are utilized. Upon attachment of the circular plate 14 to, referring to Fig. 2, the rotor plate 21, by means of screws passing through the screw receiving apertures 17 and 22, the circular plate 14 may be rotatably driven by the ceiling fan motor 20. A light fixture (not shown) may be reinstalled upon the light fixture attachment shaft 23 which extends through the light fixture receiving aperture 16.

[0039] Referring again to Fig. 1, thirty-four curved fan blades 12 extend vertically downward from the lower surface of the upper circular plate 14. Preferably, the fan blades 12 are homogeneously fused to the circular plate

14 through an injection molding process. Depending upon the overall diameter of the air filtering device, a greater or a lesser number of fan blades may be utilized. Each fan blade 12 is outwardly arcuately curved and is tilted in the direction of normal rotation for added efficiency in radial acceleration of air.

[0040] Referring simultaneously to Figs. 1 and 4, the lower outer edges of the fan blades 12 are structurally supported by a support ring 18 having an inwardly extending annular flange 13, the lower outer edges of the fan blades 12 preferably being homogeneously fused with the inner surfaces of the support ring 18, and fused with the upper surface of the annular flange 13. Referring simultaneously to Figs. 2 and 4, the outwardly facing peripheral surface of the support ring 18 preferably has a snap ridge receiving channel 24 extending annularly therearound.

[0041] Referring to Fig. 1, drawing element 5 refers generally to an air filter retaining frame containing a filtering medium. Referring to Fig. 2, the snap ridge receiving channel 24 serves the function of holding in place the air filter retaining frame and air filter 5. Referring simultaneously to Figs. 1 and 4, the air filter retaining frame and air filter 5 comprise a downwardly opening U-channel ring 6 and an upwardly opening U-channel ring 8. A pair of concentric air permeable wire grids 7 and 9 span between and interconnect the U-channel rings 6 and 8; the U-channel rings 6 and 8 and the wire grids 7 and 9 defining an interior cylindrical space for containing an air filtering medium 11. The air filtering medium 11 as depicted is a pleated fiberglass mesh. Other suitable air filtering media are: activated charcoal, pleated woven fabric filters which are either chemically treated or impregnated with activated charcoal, high efficiency particle arresting (HEPA) filters, or combinations of such filters.

[0042] Referring simultaneously to Figs. 2 and 4, a snap ridge 10 extends inwardly from the inwardly facing surface of the lower U-channel ring 8, the snap ridge 10 being fitted for retention by the snap ridge receiving channel 24.

[0043] Referring to Fig. 2, in operation of the air filtering device, the ceiling fan motor 20 is operated to rotate the upper circular plate 14 and the fan blades 12 in a clockwise fashion. Upon such rotation, air is accelerated radially outward through the openings 19 between the fan blades 12. Referring to Fig. 1, the air then passes through the air filtering retaining frame 5, and, referring to Fig. 6, through the air filtering medium 11 contained therein. As the air passes through the air filtering medium 11, the air is filtered and cleaned.

[0044] Preferably, the circular plate 14, the fan blades 12, the support ring 18, and the flange 13 are formed through a plastic injection molding process. Also preferably, referring to Fig. 4, the upper and lower U-channel rings 6 and 8 are formed through a plastic injection molding process.

[0045] Referring to Fig. 1, the air filtering device 1 pro-

vides advantages of economy in construction. The circular plate 14, the fan blades 12, and the support ring 18 may be economically constructed from injection molded plastic. The air filter retaining frame 5, along with filtering media contained therein may be inexpensively constructed allowing for economic disposal and replacement. The air filtering device 1 also economically saves power allowing a single electric motor to provide room air flow and air filtration. The air filtering device 1 further provides economy in space usage; taking up virtually no living or working space where it is installed and used. The air filtering device 1 additionally enhances the overall atmosphere of a room where it is installed and used by circulating and filtering the air while generating virtually no background noise.

[0046] While the principles of the invention have been made clear in the above illustrative embodiment, those skilled in the art may make modifications in the structure, arrangement, portions and components of the invention without departing from those principles. Accordingly, it is intended that the description and drawings be interpreted as illustrative only, and not in any limiting sense, and it is intended that the invention be given a scope commensurate with the appended claims.

Claims

1. An air filtering device (1) comprising: (a) A circular plate (14) having a central radial axis, having an outer peripheral edge, having an upper surface, and having a lower surface; (b) A plurality of fan blades (12), each fan blade having an inner edge and an outer edge, each fan blade being fixedly attached to or homogeneously fused with the circular plate, each fan blade being positioned upon the circular plate so that it extends downwardly from the lower surface of the circular plate, and so that its outer edge faces outwardly away from the central radial axis of the circular plate; (c) A filter frame (5) having an air permeable cylindrical inner wall (9), the air permeable cylindrical inner wall having an upper end and a lower end, the air permeable cylindrical inner wall being fitted for mounting over the outer edges of the fan blades; the filter frame having an upper wall (6) fixedly attached to and extending radially outward from the upper end of the air permeable cylindrical inner wall; the filter frame having a lower wall (8) fixedly attached to and extending radially outwardly from the lower end of the air permeable cylindrical inner wall; the filter frame having an air permeable cylindrical outer wall (7) fixedly attached to and spanning between the upper and lower walls; the air permeable cylindrical inner wall, the air permeable cylindrical outer wall, the upper wall and the lower wall defining a cylindrical filter media containing space; (d) Air filtering media (11) extending annularly around the air permeable cylindrical inner wall within the cylindrical

filter media containing space; and (e) **characterised in that** means (10,24) for fixedly attaching the filter frame to the circular plate are provided so that the air permeable cylindrical inner wall annularly surrounds the outer edges of the fan blades and wherein the filter frame and the fan blades are disposed in fixed adjacent relationship to one another to rotate in unison so that air flowing between the fan blades may thence flow through the filter frame for filtration by the air filtering media contained with the cylindrical filter media containing space.

2. The device of Claim No. 1, wherein each fan blade is angularly aligned with respect to the outer peripheral edge of the circular plates; and wherein each fan blade is outwardly arcuately curved.

3. The device of Claim No. 2, wherein the circular plate has a plurality of screw receiving apertures therethrough, the screw receiving apertures being positioned so that screws passing therethrough may fixedly and rotatably attach the circular plate to a rotor plate of a ceiling fan.

4. The device of Claim No. 3, wherein the air filtering media comprises activated charcoal.

5. The device of Claim No. 3, wherein the air filtering media comprises a fibreglass mesh.

6. The device of Claim No. 3, wherein the air filtering media comprises a high efficiency particle arresting (HEPA) filter.

7. The device of Claim No. 3, wherein the air filtering media comprises a woven filtering fabric.

8. The device of Claim No. 4, wherein the air permeable cylindrical inner wall of the filter frame comprises an inner wall of an upwardly opening U-channel ring, said inner wall of the upwardly opening U-channel ring having an inwardly facing peripheral surface.

9. The device of any preceding claim further comprising means for mounting the device to a rotation-imparting power source, the means comprising the circular plate; air filtration means connected to the mounting means, the air filtration means comprising the filter frame; and air acceleration means for directing air generally radially with respect to the axis of rotation, the air acceleration means connected to the mounting means and disposed adjacent to the air filtration means, the air acceleration means comprising the plurality of fan blades; the means for mounting the device to a rotation-imparting power source providing a coupling that allows the mounting means, the air filtration means and the air acceleration means to rotate in unison so as to cause the air acceleration

means to direct a flow of air through the air filtration means.

10. The device of Claim 9 wherein the device is mounted to a ceiling fan motor. 5
11. The device of Claim 10 wherein the air filtration means is disposed annularly on a lower surface of the mounting means. 10
12. The device of Claim 11 wherein the air acceleration means is disposed annularly on the lower surface of the mounting means radially inwardly of the air filtration means. 15
13. The device of any of Claims 9 to 12 wherein the plurality of fan blades are adapted to create a flow of air into the air filtration means. 20
14. The device of Claim 13 wherein the mounting means includes means for selectively securing the air filtration means. 25
15. The device of Claim 14 wherein the air acceleration means is disposed radially inwardly of the air filtration means. 30
16. The device of Claim 15 wherein the mounting means is generally conically shaped and opening downwardly from the ceiling fan motor. 35

Patentansprüche

1. Luftfiltervorrichtung (1), umfassend: (a) eine kreisförmige Platte (14) mit einer mittigen radialen Achse, einer äußeren Umfangskante, einer oberen Oberfläche und einer unteren Oberfläche; (b) eine Mehrzahl von Ventilatorblättern (12), wobei jedes Ventilatorblatt eine Innenkante und eine Außenkante aufweist, wobei jedes Ventilatorblatt fest an der kreisförmigen Platte befestigt oder damit homogen schmelzverbunden ist, wobei jedes Ventilatorblatt auf der kreisförmigen Platte derart positioniert ist, dass es sich von der unteren Oberfläche der kreisförmigen Platte abwärts erstreckt, und derart, dass seine Außenkante von der mittigen radialen Achse der kreisförmigen Platte weg nach außen gewandt ist; (c) einen Filterrahmen (5) mit einer luftdurchlässigen zylindrischen Innenwand (9), wobei die luftdurchlässige zylindrische Innenwand ein oberes Ende und ein unteres Ende aufweist, wobei die luftdurchlässige zylindrische Innenwand zur Montage über den Außenkanten der Ventilatorblätter ausgebildet ist; wobei der Filterrahmen eine obere Wand (6) aufweist, die fest an dem oberen Ende der luftdurchlässigen zylindrischen Innenwand befestigt ist und sich davon radial nach außen wegerstreckt; wobei der Filterrahmen 40 45 50 55

eine untere Wand (8) aufweist, die fest an dem unteren Ende der luftdurchlässigen zylindrischen Innenwand befestigt ist und sich davon radial nach außen wegerstreckt; wobei der Filterrahmen eine luftdurchlässige zylindrische Außenwand (7) aufweist, die fest an der oberen und der unteren Wand befestigt ist und sich zwischen diesen erstreckt; wobei die luftdurchlässige zylindrische Innenwand, die luftdurchlässige zylindrische Außenwand, die obere Wand und die untere Wand einen zylindrischen Filtermedien enthaltenden Raum definiert; (d) Luftfiltermedien (11), die sich ringförmig rund um die luftdurchlässige zylindrische Innenwand innerhalb des zylindrischen Filtermedien enthaltenden Raumes erstreckt; und (e) **dadurch gekennzeichnet, dass** Mittel (10, 24) zum festen Befestigen des Filterrahmens an der kreisförmigen Platte vorgesehen sind, so dass die luftdurchlässige zylindrische Innenwand die Außenkanten der Ventilatorblätter ringförmig umgibt, und wobei der Filterrahmen und die Ventilatorblätter in fester benachbarter Beziehung zueinander angeordnet sind, um sich in Einklang miteinander zu drehen, so dass Luft, welche zwischen den Ventilatorblättern strömt, demnach durch den Filterrahmen zur Filtrierung durch die Luftfiltermedien strömen kann, die in dem zylindrischen Filtermedien enthaltenden Raum enthalten sind.

2. Vorrichtung nach Anspruch 1, wobei jedes Ventilatorblatt in Bezug auf die äußere Umfangskante der kreisförmigen Platten winkelig ausgerichtet ist; und wobei jedes Ventilatorblatt bogenförmig nach außen gekrümmt ist.
3. Vorrichtung nach Anspruch 2, wobei die kreisförmige Platte eine Mehrzahl von Schraubenaufnahmeöffnungen dort hindurch aufweist, wobei die Schraubenaufnahmeöffnungen derart angeordnet sind, dass dort hindurch durchtretende Schrauben die kreisförmige Platte fest und drehbar an einer Rotorplatte eines Deckenventilators befestigen können.
4. Vorrichtung nach Anspruch 3, wobei die Luftfiltermedien Aktivkohle umfassen.
5. Vorrichtung nach Anspruch 3, wobei die Luftfiltermedien eine Glasfasermatte umfassen.
6. Vorrichtung nach Anspruch 3, wobei die Luftfiltermedien einen hocheffizienten Partikel auffangfilter (HEPA-Filter) umfassen.
7. Vorrichtung nach Anspruch 3, wobei die Luftfiltermedien einen gewebten Filterstoff umfassen.
8. Vorrichtung nach Anspruch 4, wobei die luftdurchlässige zylindrische Innenwand des Filterrahmens eine Innenwand eines nach oben geöffneten U-Ka-

nal-Rings umfasst, wobei die Innenwand des nach oben geöffneten U-Kanal-Rings eine einwärts gewandte Umfangsoberfläche aufweist.

9. Vorrichtung nach einem beliebigen der vorangehenden Ansprüche, ferner umfassend ein Mittel zum Anbringen der Vorrichtung an einer eine Rotation vermittelnde Kraftquelle, wobei das Mittel die kreisförmige Platte umfasst; ein Luftfiltrationsmittel, das mit dem Anbringmittel verbunden ist, wobei das Luftfiltrationsmittel den Filterrahmen umfasst; und ein Luftbeschleunigungsmittel zum Lenken von Luft im Allgemeinen radial in Bezug auf die Drehachse, wobei das Luftbeschleunigungsmittel die Mehrzahl von Ventilatorblättern umfasst; wobei das Mittel zum Anbringen der Vorrichtung an einer eine Rotation vermittelnde Kraftquelle eine Kupplung vorsieht, welche ermöglicht, dass das Anbringmittel, das Luftfiltrationsmittel und das Luftbeschleunigungsmittel in Einklang miteinander rotieren, um zu bewirken, dass das Luftbeschleunigungsmittel einen Luftstrom durch das Luftfiltrationsmittel lenkt. 5 10 15 20
10. Vorrichtung nach Anspruch 9, wobei die Vorrichtung an einem Deckenventilatormotor angebracht ist. 25
11. Vorrichtung nach Anspruch 10, wobei das Luftfiltrationsmittel ringförmig an einer unteren Oberfläche des Anbringmittels angeordnet ist. 30
12. Vorrichtung nach Anspruch 11, wobei das Luftbeschleunigungsmittel ringförmig an der unteren Oberfläche des Anbringmittels radial einwärts von dem Luftfiltrationsmittel angeordnet ist. 35
13. Vorrichtung nach einem beliebigen der Ansprüche 9 bis 12, wobei die Mehrzahl von Ventilatorblättern ausgebildet sind, um einen Luftstrom in das Luftfiltrationsmittel zu erzeugen. 40
14. Vorrichtung nach Anspruch 13, wobei das Anbringmittel ein Mittel zum selektiven Sichern des Luftfiltrationsmittels umfasst. 45
15. Vorrichtung nach Anspruch 14, wobei das Luftbeschleunigungsmittel radial einwärts von dem Luftfiltrationsmittel angeordnet ist. 50
16. Vorrichtung nach Anspruch 15, wobei das Anbringmittel im Allgemeinen konisch geformt und von dem Deckenventilatormotor nach unten geöffnet ist.

Revendications

1. Dispositif de filtration d'air (1) comprenant : (a) un plateau circulaire (14) ayant un axe radial central, ayant un bord périphérique extérieur, ayant une sur-

face supérieure et ayant une surface inférieure ; (b) une pluralité d'ailettes (12), chaque ailette ayant un bord intérieur et un bord extérieur, chaque ailette étant attachée fixement ou fusionnée de façon homogène au plateau circulaire, chaque ailette étant positionnée sur le plateau circulaire de façon à s'étendre vers le bas depuis la surface inférieure du plateau circulaire et de façon que son bord extérieur soit tourné vers l'extérieur en direction opposée à l'axe radial central du plateau circulaire ; (c) un cadre de filtre (5) ayant une paroi intérieure cylindrique perméable à l'air (9), la paroi intérieure cylindrique perméable à l'air ayant une extrémité supérieure et une extrémité inférieure, la paroi intérieure cylindrique perméable à l'air étant adaptée pour être montée sur les bords extérieurs des ailettes ; le cadre de filtre ayant une paroi supérieure (6) attachée fixement à et s'étendant radialement vers l'extérieur depuis l'extrémité supérieure de la paroi intérieure cylindrique perméable à l'air ; le cadre de filtre ayant une paroi inférieure (8) attachée fixement à et s'étendant radialement vers l'extérieur depuis l'extrémité inférieure de la paroi intérieure cylindrique perméable à l'air ; le cadre de filtre ayant une paroi extérieure cylindrique perméable à l'air (7) attachée fixement à et s'étendant entre les parois supérieure et inférieure ; la paroi intérieure cylindrique perméable à l'air, la paroi extérieure cylindrique perméable à l'air, la paroi supérieure et la paroi inférieure définissant un espace de retenue de milieu filtrant cylindrique ; (d) un milieu de filtration d'air (11) s'étendant en anneau autour de la paroi intérieure cylindrique perméable à l'air à l'intérieur de l'espace de retenue de milieu filtrant cylindrique ; et (e) **caractérisé en ce que** des moyens (10, 24) destinés à attacher fixement le cadre de filtre au plateau circulaire sont prévus de telle façon que la paroi intérieure cylindrique perméable à l'air entoure de façon annulaire les bords extérieurs des ailettes et dans lequel le cadre de filtre et les ailettes sont disposés en relation adjacente fixe les uns par rapport aux autres pour tourner à l'unisson de telle façon que l'air s'écoulant entre les ailettes peut ainsi s'écouler à travers le cadre de filtre pour permettre une filtration par le milieu de filtration d'air retenu dans l'espace de retenue de milieu filtrant cylindrique.

2. Dispositif selon la revendication 1, dans lequel chaque ailette est alignée de façon angulaire par rapport au bord périphérique extérieur du plateau circulaire ; et dans lequel chaque ailette est courbée en arc vers l'extérieur.

3. Dispositif selon la revendication 2, dans lequel le plateau circulaire présente une pluralité d'ouvertures de réception de vis à travers celui-ci, les ouvertures de réception de vis étant positionnées de telle façon que les vis passant à travers celles-ci peuvent atta-

cher fixement et d'une manière permettant la rotation le plateau circulaire à un plateau rotor d'un ventilateur de plafond.

4. Dispositif selon la revendication 3, dans lequel le milieu de filtration d'air est constitué de charbon actif.
5. Dispositif selon la revendication 3, dans lequel le milieu de filtration d'air est constitué d'un treillis en fibre de verre.
6. Dispositif selon la revendication 3, dans lequel le milieu de filtration d'air est constitué d'un filtre absolu à haute efficacité (HEPA).
7. Dispositif selon la revendication 3, dans lequel le milieu de filtration d'air est constitué d'un tissu tissé filtrant.
8. Dispositif selon la revendication 4, dans lequel la paroi intérieure cylindrique perméable à l'air du cadre de filtre comprend une paroi intérieure d'un anneau à gorge en U s'ouvrant vers le haut, ladite paroi intérieure de l'anneau à gorge en U s'ouvrant vers le haut ayant une surface périphérique tournée vers l'intérieur.
9. Dispositif selon une quelconque revendication précédente, comprenant en outre des moyens pour monter le dispositif sur une source de puissance imprimant une rotation, les moyens comprenant le plateau circulaire ; des moyens de filtration d'air connectés aux moyens de montage, les moyens de filtration d'air comprenant le cadre de filtre ; et des moyens d'accélération d'air destinés à diriger l'air globalement en direction radiale par rapport à l'axe de rotation, les moyens d'accélération d'air étant connectés aux moyens de montage et disposés à côté des moyens de filtration d'air, les moyens d'accélération d'air comprenant la pluralité d'ailettes ; les moyens pour monter le dispositif sur une source de puissance imprimant une rotation assurant un couplage qui permet aux moyens de montage, aux moyens de filtration d'air et aux moyens d'accélération d'air de tourner à l'unisson de façon à faire envoyer par les moyens d'accélération d'air un flux d'air à travers les moyens de filtration d'air.
10. Dispositif selon la revendication 9, dans lequel le dispositif est monté sur un moteur de ventilateur de plafond.
11. Dispositif selon la revendication 10, dans lequel les moyens de filtration d'air sont disposés en anneau sur une surface inférieure des moyens de montage.
12. Dispositif selon la revendication 11, dans lequel les moyens d'accélération d'air sont disposés en an-

neau sur la surface inférieure des moyens de montage radialement vers l'intérieur des moyens de filtration d'air.

13. Dispositif selon l'une quelconque des revendications 9 à 12, dans lequel la pluralité d'ailettes sont adaptées pour créer un flux d'air dans les moyens de filtration d'air.
14. Dispositif selon la revendication 13, dans lequel les moyens de montage comprennent des moyens pour attacher sélectivement les moyens de filtration d'air.
15. Dispositif selon la revendication 14, dans lequel les moyens d'accélération d'air sont disposés radialement vers l'intérieur des moyens de filtration d'air.
16. Dispositif selon la revendication 15, dans lequel les moyens de montage sont globalement de forme conique et s'ouvrent vers le bas depuis le moteur de ventilateur de plafond.

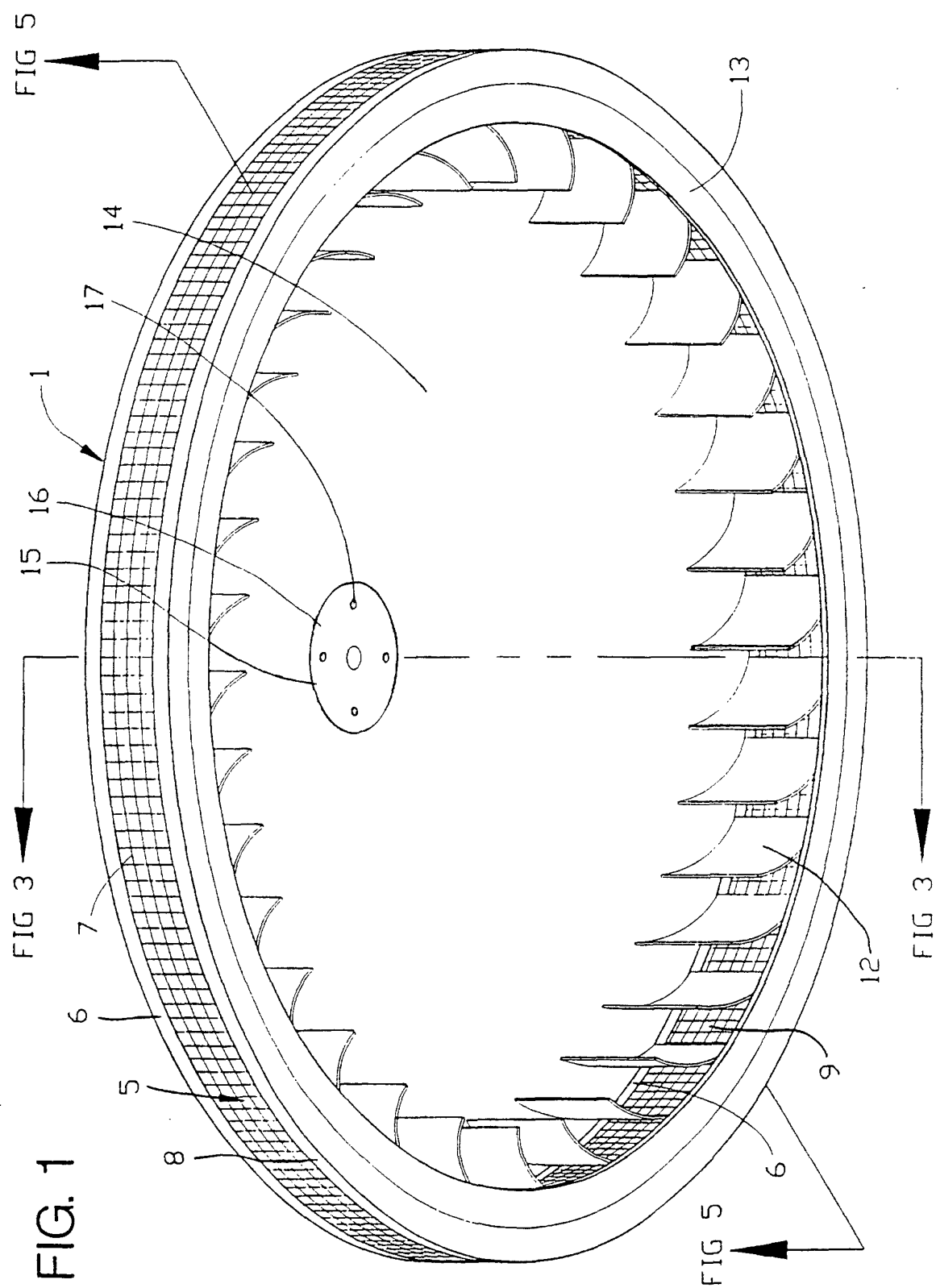


FIG. 2

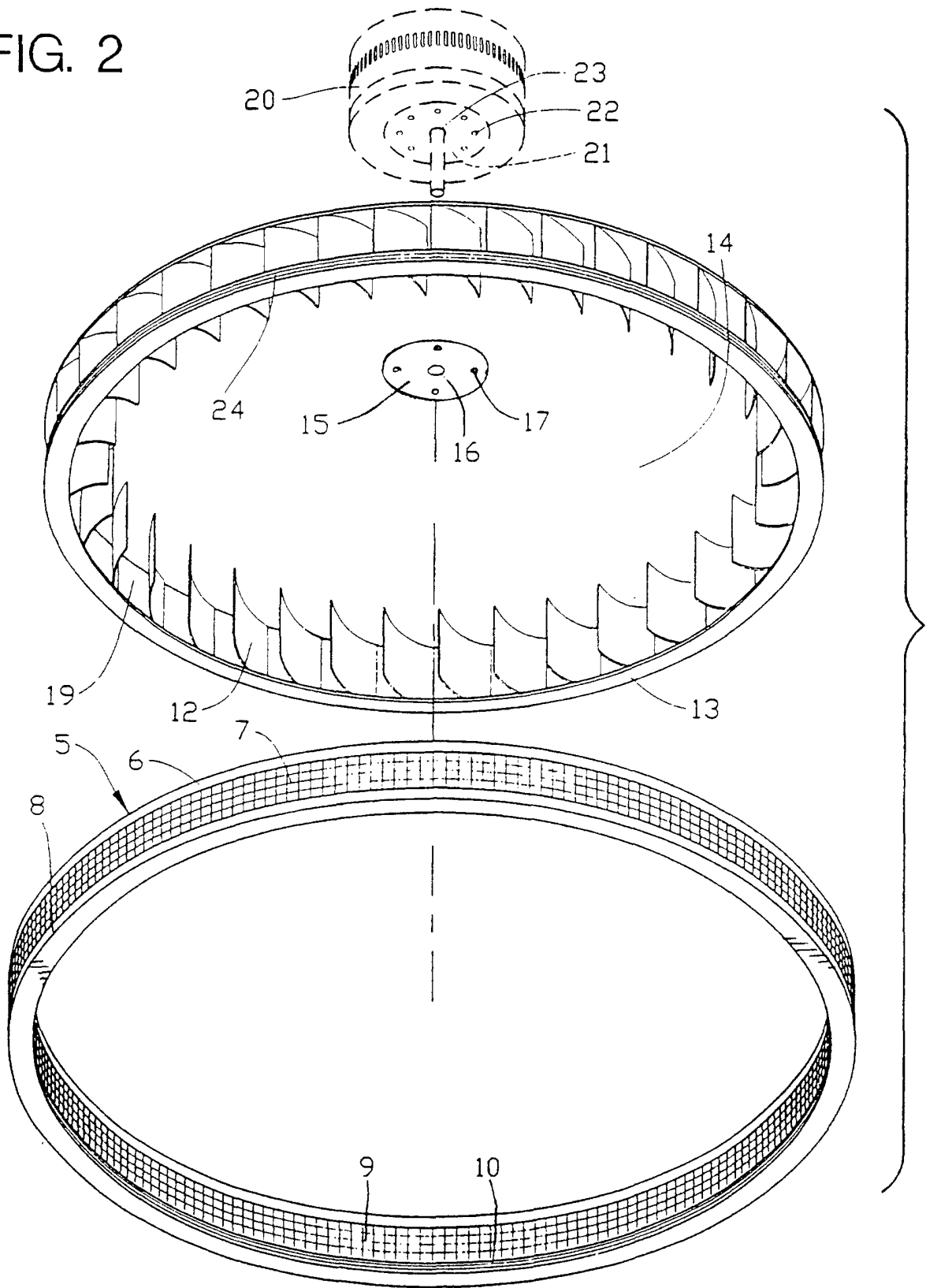


FIG. 3

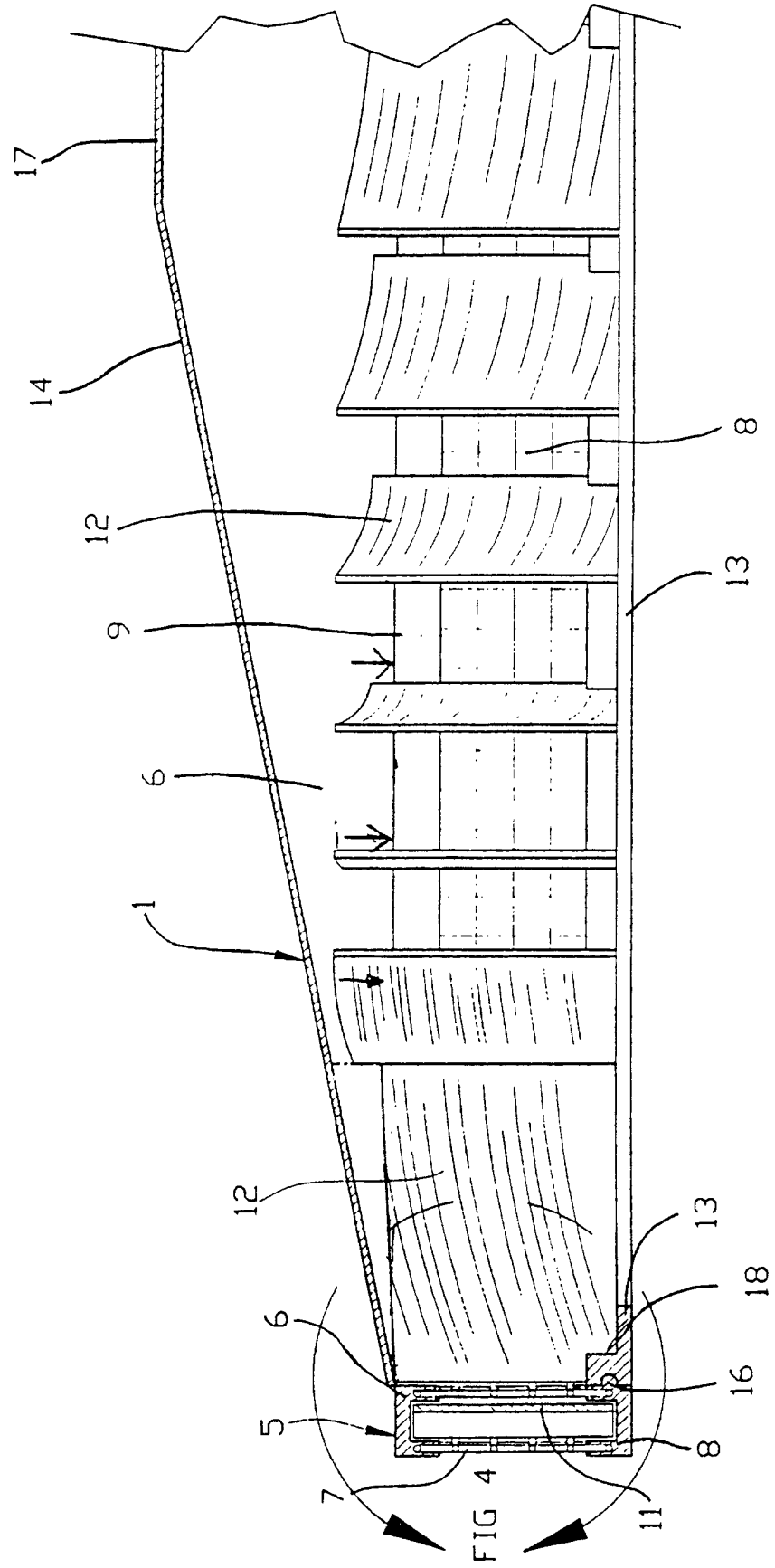
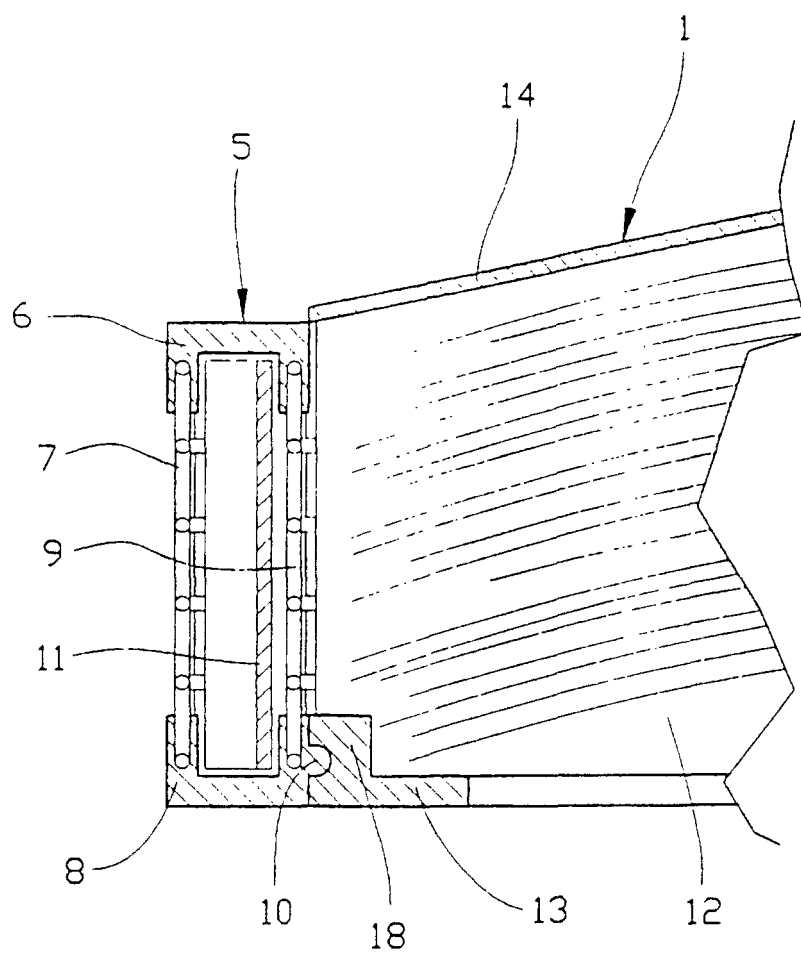


FIG. 4



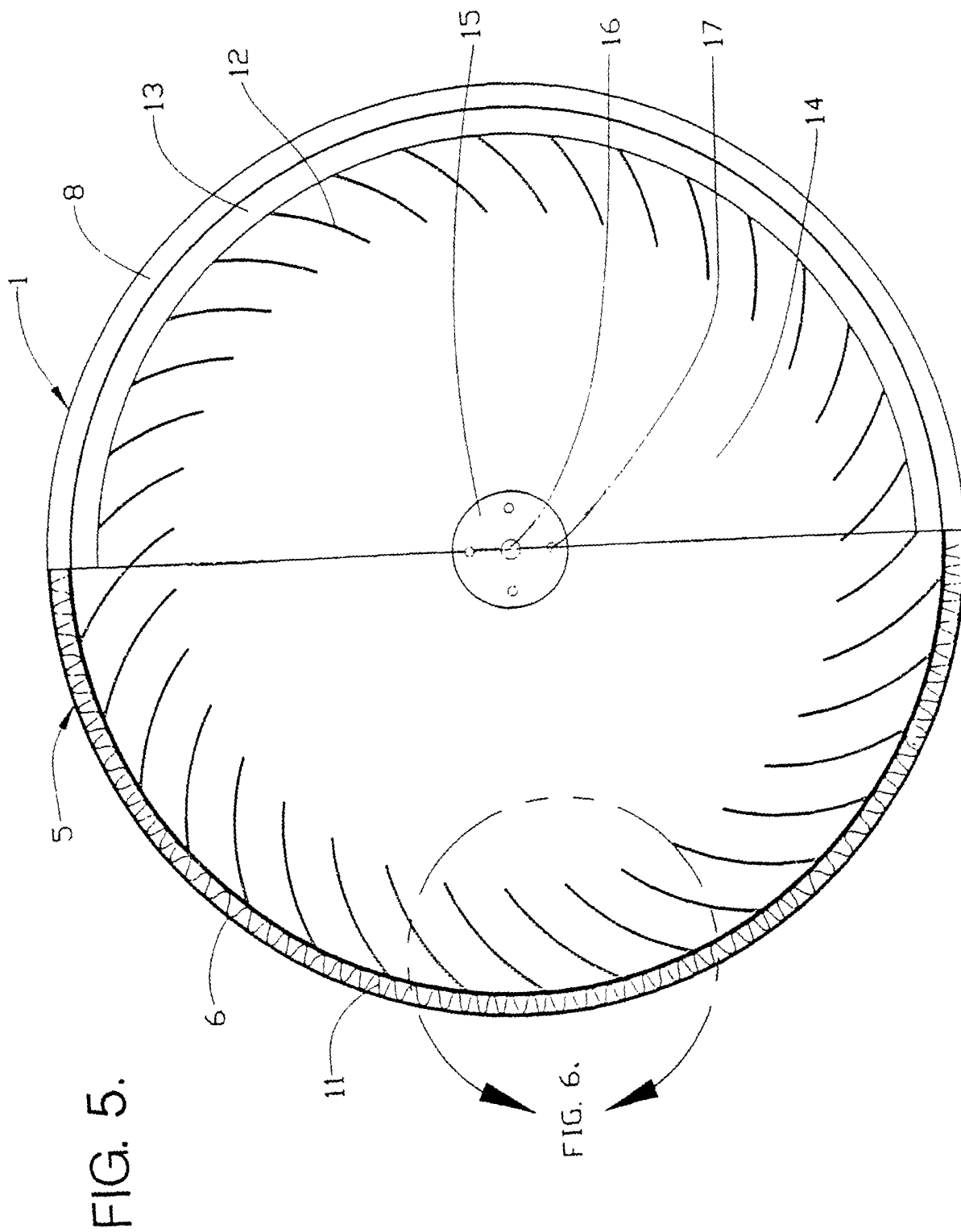


FIG. 6.

